REMARKS

It is respectfully requested that the Examiner enter these amendments prior to examining the application on its merits.

Respectfully submitted,

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SUBSTITUTE SHEET

Patent claims:

1. A biological joint construct produced at least partly in vitro, comprising the following constituents:

a) at least one biocompatible carrier material;

b) cartilaginous tissue comprising chondrocytes and/or chondroblasts and cartilaginous substance;

c) osseous tissue comprising osteoblasts and/or osteocytes and bone substance;

cartilaginous and osseous tissue being firmly connected to one another, characterized in that the biological joint construct has a joint side which can have contact with another joint part and whose surface consists of cartilaginous tissue, and an anchor side which can be used for anchoring the joint construct in the bone shaft and which consists of osseous tissue.

2. The biological joint construct as claimed in claim 1, characterized in that the osseous tissue comprises, for the improvement of angiogenesis, a growth factor protein, endothelial cells or their precursor cells, or cells transfected with a growth factor gene.

3. The biological joint construct as claimed in claim 1, characterized in that the anchor side has at least one cylindrical peg which can be connected to the bone shaft.

4. The biological joint construct as claimed in claim 1, characterized in that it additionally comprises at least one ligamentous component, which can connect the two joint parts functionally to one another.

5. The biological joint construct as claimed in claim 1, characterized in that the joint construct is suitable for the partial replacement of a joint surface and is designed as an individual preformed construct.

6. The biological joint construct as claimed in claim 1, characterized in that the joint construct is suitable for the partial replacement of a joint surface and is designed as an osteochondral cylinder.

7. A biological joint replacement, characterized in that at least two joint constructs as claimed in claim 3 have contact with one another with their joint sides and can be anchored with the anchor sides in two different bone shafts.

8. The biological joint replacement as claimed in claim 7, characterized in that at least two joint constructs are connected by at least two ligamentous components.

9. The biological joint replacement as claimed in claim 7, characterized in that it has a joint capsule.

10. A process for the production of a biological joint construct as claimed in claim 1, which comprises the following steps:

a) production of a bone component by populating a biocompatible carrier material with osteoblasts;

b) production of a cartilaginous component by preparation of a suspension of chondrocytes in a medium or gel or by population of the biocompatible carrier substance with chondrocytes;

c) connection of the osseous and the cartilaginous component such that the carrier material is integrated into the cartilage;

d) culture of the construct in vitro, a biological crosslinkage of the combined components being achieved by stimulation of the cells to attachment and to the synthesis of their tissue-specific extracellular matrix;

11. The process as claimed in claim 10, characterized in that the carrier material of the bone component (a) is shaped such that it has a joint side for the acceptance of a cartilage surface and an anchor side for connection to a bone.

12. The process as claimed in claim 10, characterized in that, for the production of the cartilaginous component (b)

aa) chondrocytes are suspended in the thrombin component of a fibrin adhesive,

bb) this suspension is mixed with the fibrinogen component of the fibrin adhesive,

cc) the mixture is brought into an anatomically desired shape.

13. The process as claimed in claim 11, characterized in that the bone component (a) and the cartilaginous component (b) are cultured separately in vitro before connection.

14. The process as claimed in claim 13, characterized in that the connection (c) of bone component and cartilaginous component is carried out by means of fibrin adhesion.

15. The process as claimed in claim 12, characterized in that during the solidification of the fibrin adhesive in the production of the cartilaginous component the carrier material, which is still not populated by osteoblasts, of the bone component is pressed into the cartilaginous layer such that it is firmly bound and,
in that later the population of the bone component is carried out by means of osteoblasts.

16. The process as claimed in claim 10, characterized in that it furthermore comprises the production of a ligamentous component made of fibrous materials and fibroblasts.

17. The process as claimed in claim 10, characterized in that it furthermore comprises the production of a capsular component made of fibrous, membranous materials and fibroblasts.

18. The process as claimed in claim 10, characterized in that at least one ligament connection site for the attachment of joint ligaments is attached to the carrier material of the bone component.

19. The process as claimed in claim 10, characterized in that at least one capsule connecting area is attached to the carrier material of the bone component for attachment of a joint capsule.

20. The process as claimed in claim 10, characterized in that at least one ligament component is attached to a ligament connection site of the bone component.

21. The process as claimed in claim 10, characterized in that at least one capsule component is attached to a capsule connection area of the bone component.

22. The process as claimed in claim 10, characterized in that endothelial cells, a growth factor protein, or cells transfected with a growth factor gene are added to the bone component.

23. The process as claimed in claim 10 for the preparation of osseous tissue (c), characterized in that spongiosa is used as a carrier material.

24. The process as claimed in claim 23, characterized in that autoclaved, human, allogenic spongiosa is used as a carrier material.

25. The process as claimed in claim 10 for the preparation of bone tissue, which comprises the following steps:

a) isolation of bone cells or bone precursor cells;

b) transfection of the cells by nonviral gene transfer using at least one gene which codes for a growth factor;

c) population of a biocompatible carrier material with the transfected cells;

d) culture of the cell-carrier material constructs in vitro.

26. The process as claimed in claim 25, characterized in that the isolated cells are proliferated before transfection.

27. The process as claimed in claim 25, characterized in that the transfection is carried out by lipofection.

28. The process as claimed in claim 25, characterized in that the transfection is transient.

29. The process as claimed in claim 25, characterized in that the transfected gene or at least one of the transfected genes codes for a growth factor which is selected from the following group: EGF, bFGF, VEGF, BMP-1 to BMP-20, TGF-β, PDGF-AA, PDGF-AB, PDGF-BB, Ang I, Ang II.

30. The process as claimed in claim 25, characterized in that the biocompatible carrier material is also populated with nontransfected cells.

31. The process as claimed in claim 30, characterized in that the isolated cells are stromal cells.